



Innovations to Expand Horizons

Innovation in Container Shipping

Challenges of an Industry in need of new strategies for
the future

&

What role will technology play in the continuing evolution
of the sector

Ronald D. Widdows

Executive Chairman, American Intermodal Management, LLC & Chairman, World Shipping Council




Today's Discussion

There is a critical need for new innovations to enable the Liner Shipping industry to continue to evolve and support the growth that will come over the longer term. We will specifically examine the need for innovation in;

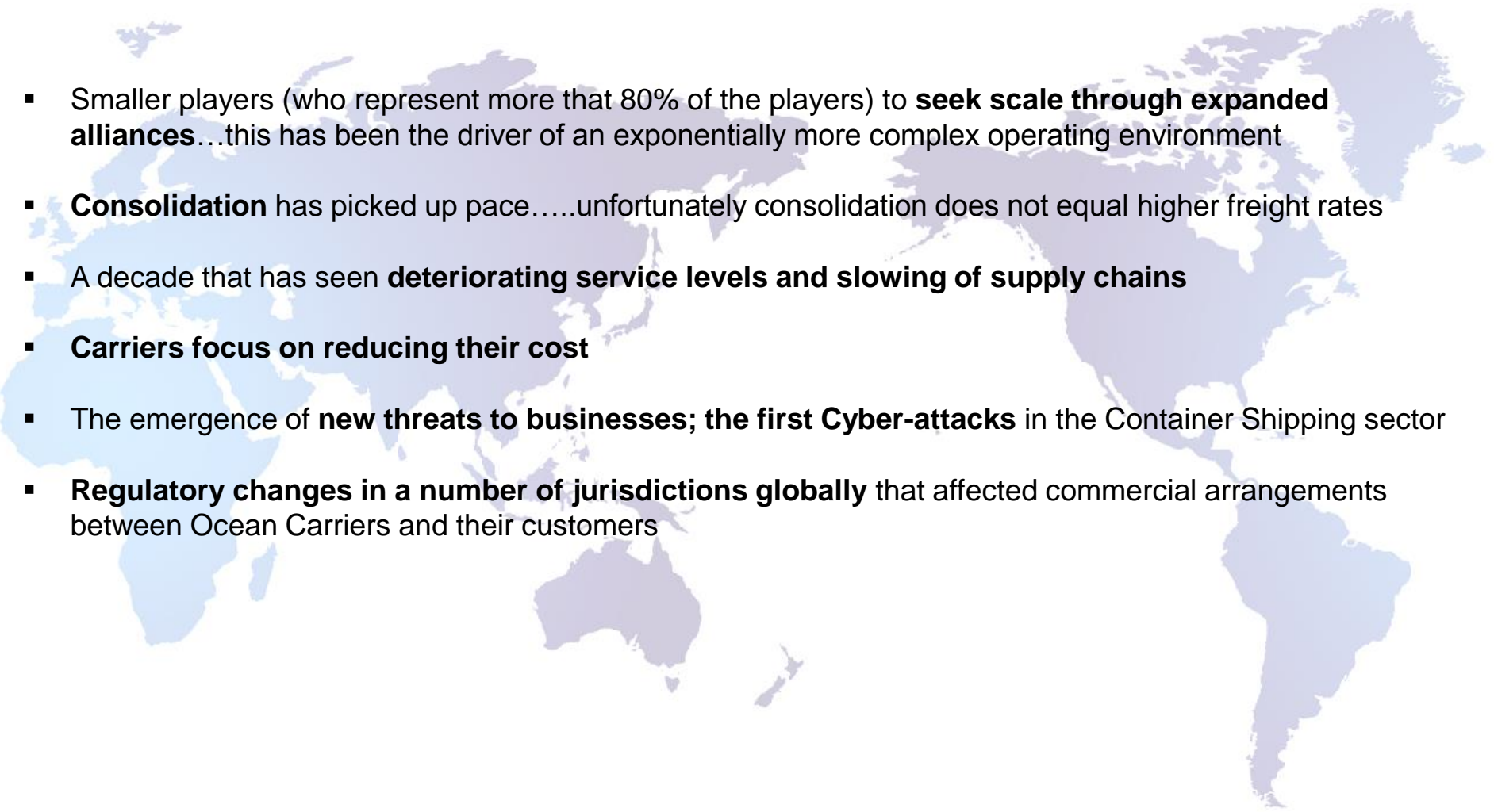
- **Collaboration/cooperation between key stakeholders**
- **Innovation required to change commercial relationships**, and new services that will lead to financial performance that is sustainable
- The role/impact of **innovations in technology and leveraging data**
- Immediate need for **new technology and processes to cope with the looming fuel standards and emissions regulations**
- Growth...how the sector can **develop new capabilities to support growth** over the long term

The consequences of Liner Shipping not pursuing new and innovative approaches

Macro View – The last Decade of Container Shipping Sector Development

- 
- The first half of the 2000's saw the container sector ride the wave of **Globalization** and the dramatic growth of China to historic highs in earnings
 - An **explosion in ship ordering** to stay ahead of double digit trade growth followed
 - The **global financial crisis** in 2009 and the cratering of demand produced gargantuan losses for the sector
 - **High fuel prices** coupled with **historic low asset prices** post 2009 continued to stimulate massive ship ordering and a rapid increase in ship size in spite of building over-supply
 - The near **decade long slide in sector profitability** that began in 2008 (with the exception of 2010) will likely continue for at least the next few years
 - **Global growth has slowed**, consequently, the sector will have to deal with over-supply for a number of years to come
 - The **emergence of the Mega-Carriers** with the scale of multiples of most of the rest in the sector
 - The **evolution of Mega Ships** and the knock on impacts these beasts create for terminals and infrastructure

Macro View – The last Decade of Container Shipping Sector Development

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- Smaller players (who represent more than 80% of the players) to **seek scale through expanded alliances**...this has been the driver of an exponentially more complex operating environment
 - **Consolidation** has picked up pace.....unfortunately consolidation does not equal higher freight rates
 - A decade that has seen **deteriorating service levels and slowing of supply chains**
 - **Carriers focus on reducing their cost**
 - The emergence of **new threats to businesses; the first Cyber-attacks** in the Container Shipping sector
 - **Regulatory changes in a number of jurisdictions globally** that affected commercial arrangements between Ocean Carriers and their customers

Stepping back...an example of earlier innovation in the industry....APL



The innovator of
Stacktrain



The 1st Post Panamax
container ships



Early mover in
development of
proprietary
customer portals

An Innovator of intermodalism in
the container shipping space

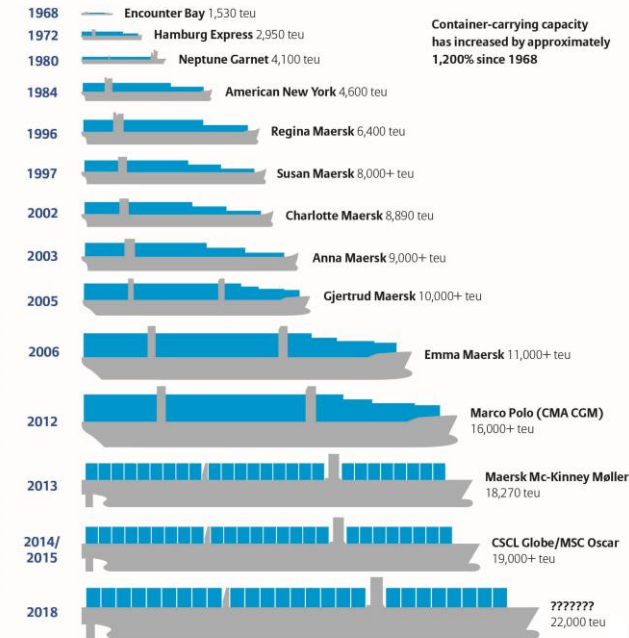


The first move to 48' and 53" ocean
containers



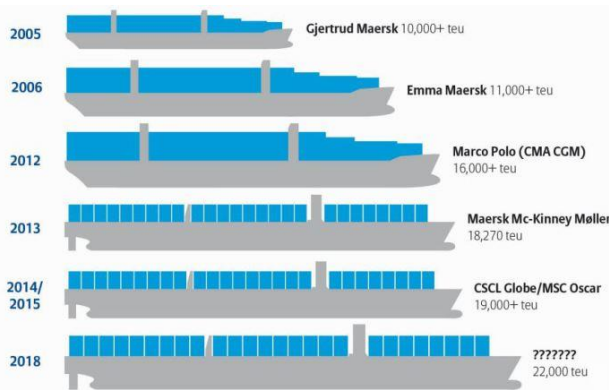
Innovation in ship sizes and technology have increased dramatically over the last 50 years

50 years of Container Ship Growth



Graphic: Allianz Global Corporate & Specialty.
Approximate ship capacity data: Container-transportation.com

In the last 5 years, the move to “mega-ships” has picked up pace



The increase in size has driven terminal expansion, a new generation of cranes, handling equipment and terminal automation

Schedule reliability has unfortunately deteriorated in some lanes where landside capabilities to support significantly larger ships has been challenged

Advances in engine and hull form design have contributed to greater fuel efficiency

Innovation going forward will be driven by a critical imperative to reduce consumption and cope with new environmental standards



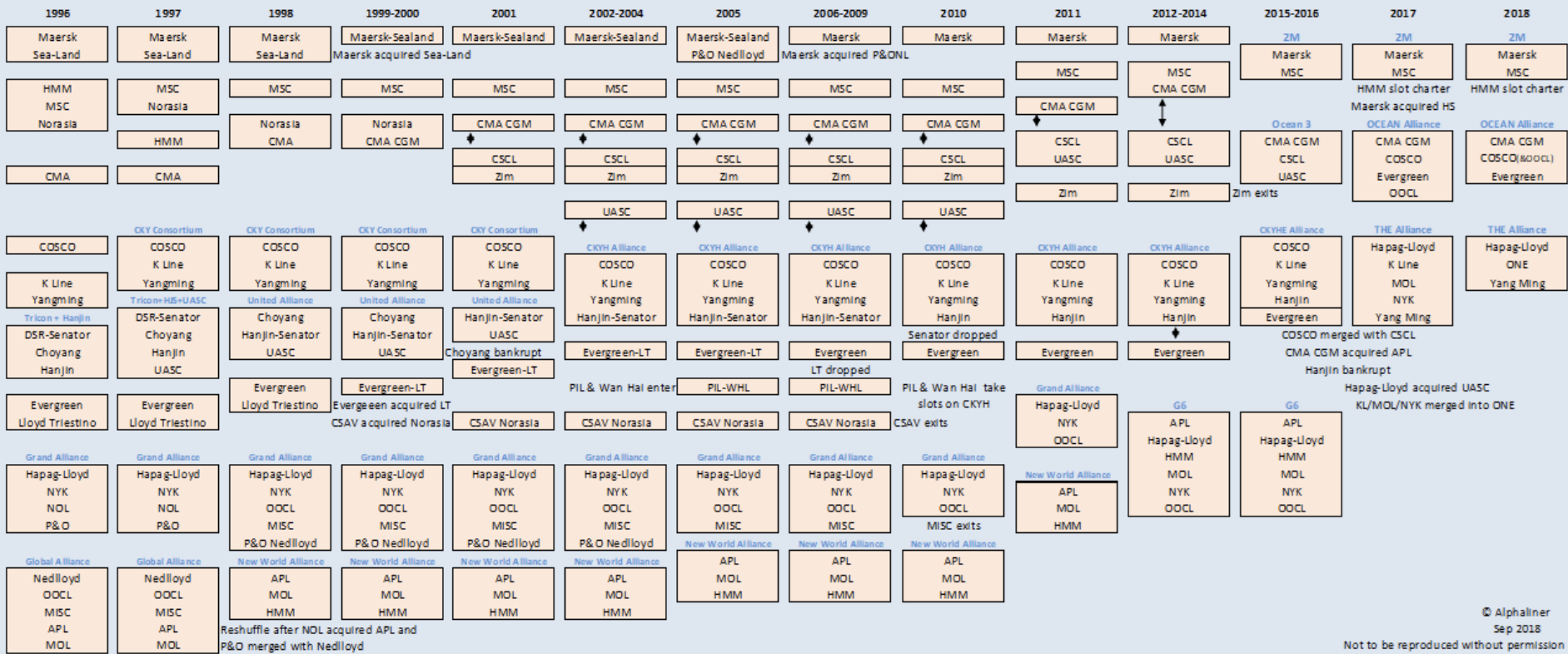
Alliance Evolution 1996 to 2017 - Innovation not yet

Changes in the make up of alliances has been driven by a number of factors; consolidation, partner commitment to larger ship sizes as well as competitive dynamics in the market



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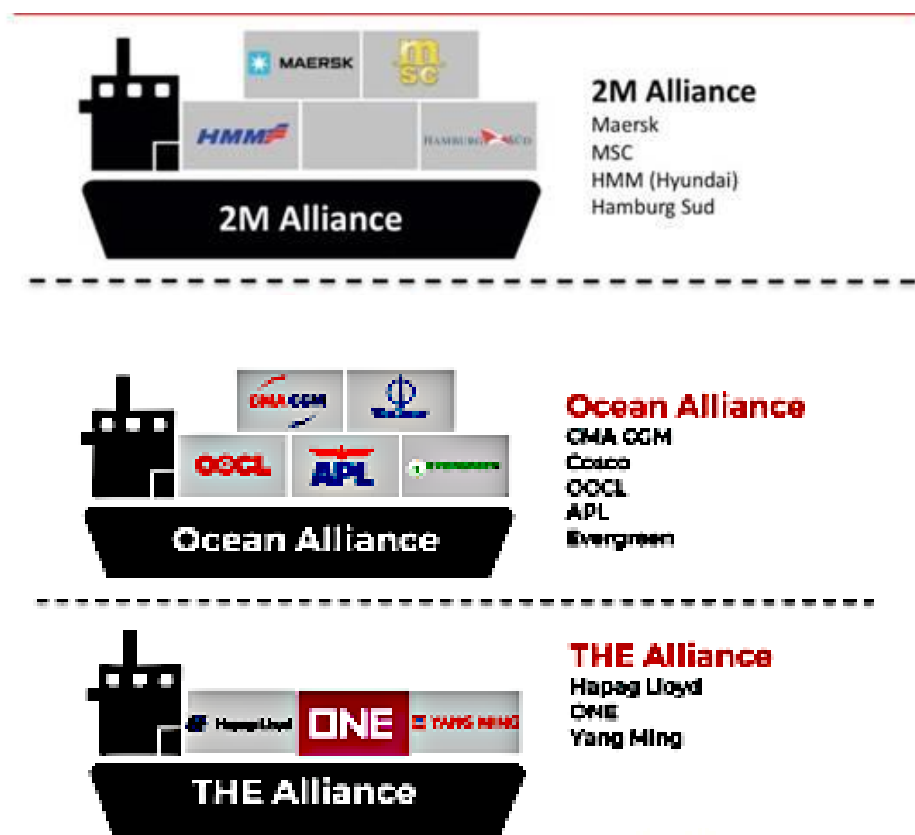
Development of Carrier Alliances on the Far East-North Europe trade 1996-2018



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The sector has distilled into three major alliances and a handful of independents



Source: Alphaliner

Consolidation has contributed to the development of “Mega-Alliance’s” that represent the bulk of capacity globally

There remain only a handful of independent carriers who have had to turn to cooperation with one of the major alliances to achieve a more competitive scope of service offering

These large alliances do create added complexity, have resulted in a narrowing of choice for shippers, but have enabled substantial cost efficiencies on the ocean

Not innovation per se but improvements in cost

Consolidation/Concentration in Container Shipping

Exhibit 7 The container-shipping industry continues to concentrate.



¹Twenty-foot equivalent unit.

²Figures may not sum to 100%, because of rounding.


³As of July 2017 and includes Hapag-Lloyd + UASC, Maersk + Hamburg Süd, CMA CGM + APL, merged capacity of 3 Japanese liners, and COSCO + CSCL + OOCL.

Source: Alphaliner; McKinsey analysis

The advent of containers introduced assembly-line efficiency into the formerly chaotic practices of shipping breakbulk cargo. The economics of the business therefore shifted toward industrial-scale organizations that could afford the upfront investment both in infrastructure for containers and, over time, in a network of routes to ensure that they were highly utilized. The numerous small companies that made up the container-shipping industry of the 1960s have therefore consolidated into a handful of behemoths. One of the largest, Maersk Line, recently generated revenues on par with those of McDonald's or SAP in 2015. The top five container-shipping companies now account for 64 percent of market capacity—an increase of nearly 30 percentage points since 2000 (Exhibit 7).

Larger and more highly automated terminals

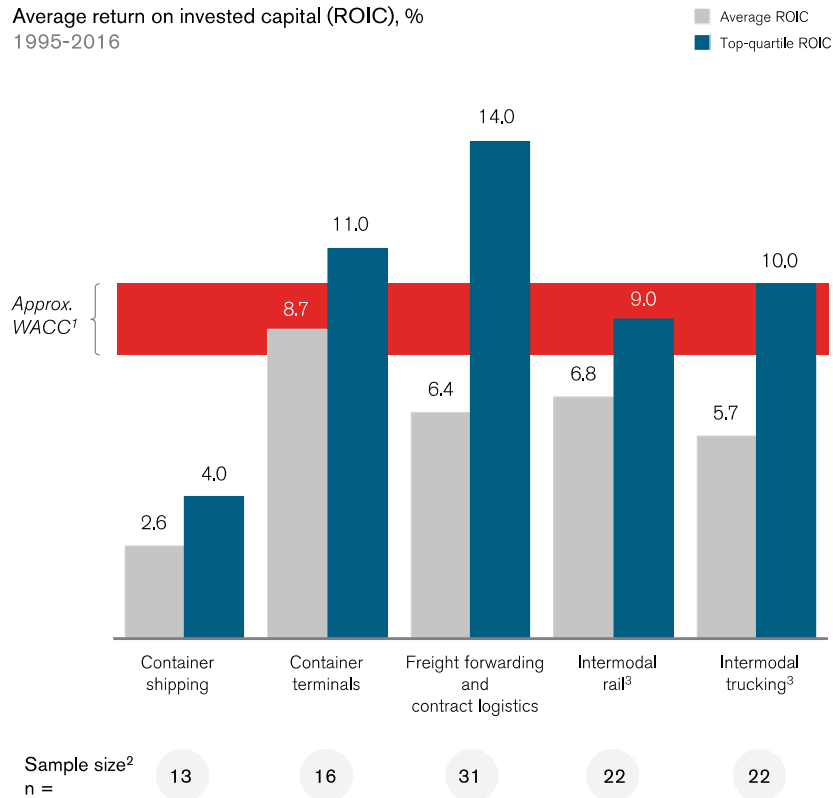




Cause for action, need for innovative approaches to commercial strategies & how to price

An Industry in need of finding a path to sustainable profitability

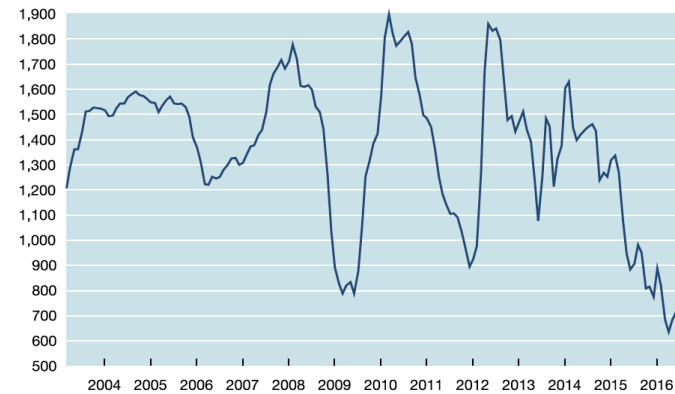
Average return on invested capital (ROIC), %
1995-2016



¹ Weighted average cost of capital; estimated at 8-10%
² Sample size varies across years due to data unavailability
³ Includes non-containerised transport
 SOURCE: Capital IQ, McKinsey analysis

Alliances have hardly stabilized the industry.

CCFI Composite Freight Rate index¹



¹Weighted average return on invested capital (ROIC) of Evergreen Marine, Hapag-Lloyd, HMM, Kawasaki Kisen, Maersk, MSC, Star Line, NYK, OOCL, P&O, and Wan Hai. Leases are not capitalized.
²Weighted average cost of capital (WACC) of COSCO, CMA, Maersk, MSC, Star Line, P&O, and Wan Hai. The cost of equity is based on the capital-asset-pricing-model methodology using a risk-free rate of 4.5%, a market-equity-premium rate of 5%, and an 0.8 asset beta. The cost of debt is based on the risk-free rate plus credit spread based on respective credit rating.
³Estimate for the whole industry; extrapolation, based on market share, from the players in the sample.

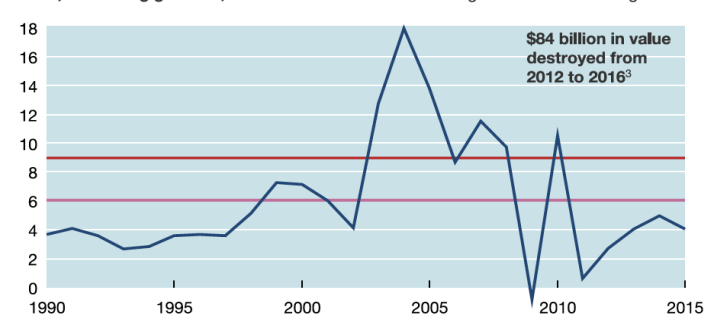
McKinsey&Company | Source: Clarksons

¹China Containerized Freight Index; reflects price of containers leaving from all major ports in China and is a composite of spot rates and contractual rate.

McKinsey&Company | Source: Clarksons

The industry has experienced massive value destruction during the past four years.

ROIC,¹ excluding goodwill, %

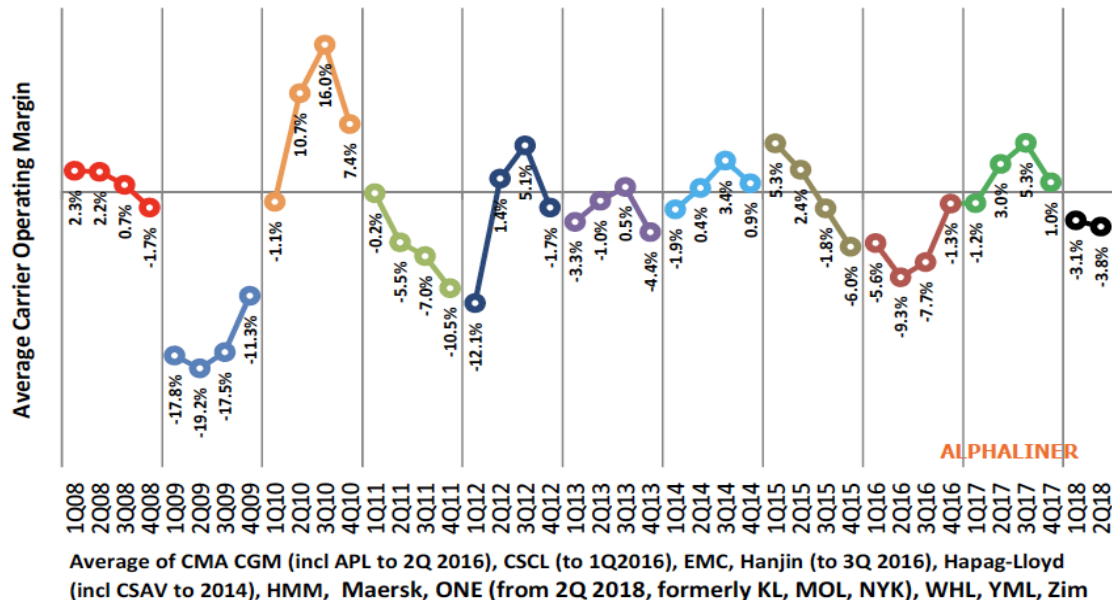


Macro View – The last Decade of Container Shipping Sector Development

The industry has **focused much of its attention on increasing scale and reducing cost** on the ocean however the efforts have failed to change the trajectory of an industry that has trapped itself in an environment of poor financial performance relative to nearly every other sector of transportation.

Innovation in the Container Shipping sector has **been more about the physical assets**; larger ships, much larger terminals, terminal automation **with only the beginnings of the focus on how we do business, how information is leveraged, how we address the needs for vastly improved levels of visibility and data analytics to raise service levels and enable our customers to optimize their supply chains.**

Main carriers - average operating margin by quarter : 2008-2018

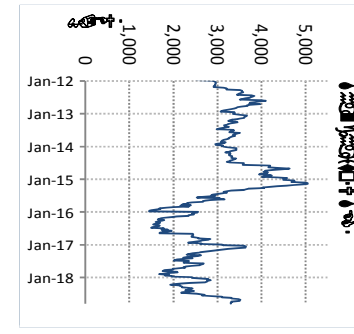
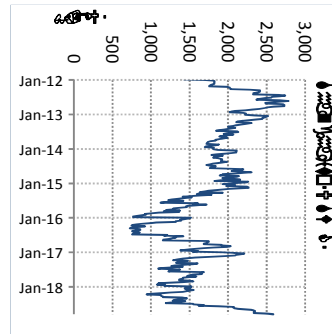
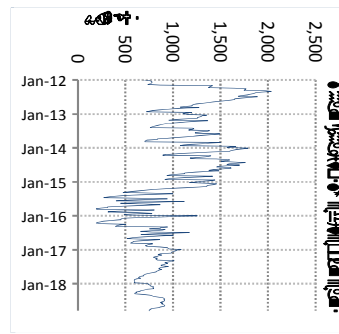
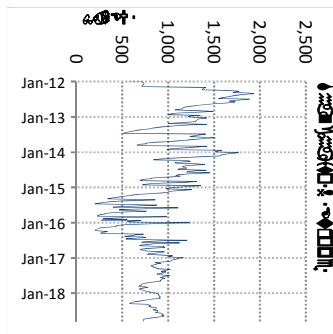


If there is a single graphic that crystalizes the case for the critical need for further innovation in our sector....

With the exception of 2010 when a massive amount of capacity was withdrawn from the market.....this has been a pretty grim sector

Current State

- Container Shipping **continues to struggle with structural over-supply and downward pressure on ocean freight rates.**
- 2018 has seen a much stronger peak season, particularly into the U.S. market; **clearly there threat of further tariff action by the U.S. has contributed to the surge in volumes** that appears to be continuing well into Q4 and the traditional slack season
- **In the near term there will be some stiffening of pricing**, but it is likely that the **broader industry dynamics will return and the pressure on price**, and profitability will remain challenging over the next few years without some dramatic developments
- What has been so is that **consolidation and the development of larger alliances have had little effect on the pricing dynamics in the market....**example; pricing trends in some key markets over the last 6 years below....volatility continues



Current State - continued

- While **there are untapped opportunities for improved efficiency on the landside**, many have yet to be exploited due to the complexities that now exist in the operating environment as well as some regulatory concerns in some jurisdictions
- The combination of **consolidation and re-alignment of alliance structures has not materially decreased complexity**, it may over time however the the current dynamics continue to put pressure on terminal velocities and container dwell times
- Innovation in how to collaborate...an area of need focus that will develop further over time:
 - Between carriers,
 - Within alliances,
 - Across alliances,
 - Between carriers and ports/terminals,
 - Between competing ports/terminals



A light blue world map is centered in the background of the slide. The text "Innovation Leveraging Technology and Data Analytics" is overlaid on the map, centered horizontally and slightly above the vertical center.

Innovation Leveraging Technology and Data Analytics

Emergence of new technology – a wide array of innovations leveraging new technology and data



BLOCK CHAIN TECHNOLOGY



FLEXPORT

Why Report? Enterprise Ready Our Company

FREIGHT FORWARDER FOR THE INTERNET AGE

Full-service air and ocean freight forwarder providing visibility and control over your entire supply chain through software.

GET STARTED

LEARN MORE



ARTIFICIAL INTELLIGENCE



PREDICTIVE ANALYTICS

Amazon Wants to Use Predictive Analytics to Offer Anticipatory Shipping







Satellite

Equipment Manager
Manage vessels

Office
Make to order delivery
270,000 Miles will take better container

Terminals

VSAT equipped vessels
-270 + -130
Vessels covered

The RCM solution consists of:

- 1 GPS unit
- 2 data interface
- 3 turn-in



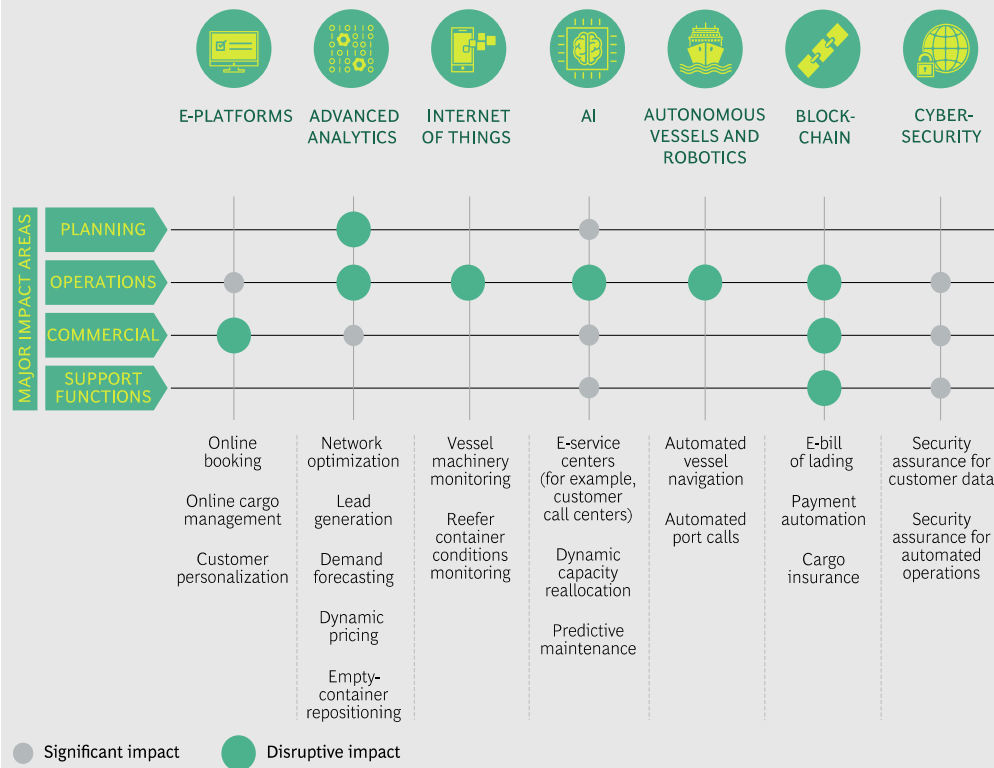






The Digital Imperative in Container Shipping, The Boston Consulting Group, February 2018

EXHIBIT 2 | Seven Digital Trends Will Transform Container Shipping



Source: BCG analysis.

Only a few leading carriers have applied digital technologies toward enhancing their commercial and operational activities. Box tracking, empty-container repositioning, document management, network design, and pricing are among the activities that these carriers have started to digitalize.

Although the rewards of a digital transformation can be significant, so are the challenges to making it happen. To succeed, carriers must adopt a structured approach to defining a digital vision and integrating new technologies, capabilities, and mindsets into their traditional way of working. It is not too late to get started. The industry is still in the early stages of digitalization, and most carriers have yet to achieve significant progress.

Carriers that approach a digital transformation with the right ambition, resources, and scale can leap to the forefront of adoption. Within 18 months, they can achieve a step change in their digital capabilities that strengthens their competitive advantage. Quick wins are achievable within 12 months."

"The time has come for the container-shipping industry to join the digital revolution. Digital opens the door for carriers to strengthen their direct relationships with end customers, further reduce their costs (including for fuel, vessel operation, and customer service), and pursue new revenue streams beyond traditional shipping services

Emergence of new technology – disruption from new entrants/non asset players

Exhibit 9 **Digital start-ups are proliferating.**

New players' offerings by value sources

| | | Superior market transparency | Stronger purchasing power | Supplier management | Leverage of information/data | Value-added specialist services | E2E offering | Physical consolidation | Solution tailoring | Transportation |
|--------------------|-------------------------------|--|--|--|------------------------------|---------------------------------|--------------|------------------------|---|----------------|
| New market players | Digital freight forwarders | Flexport | Freight Filter | Shippabo | Kontainers | iContainers | | | | |
| | Customer-facing specialists | Rate analytics • Freightos • Logisttrade • Transportica • Xeneta | Collaboration platforms • GT Nexus | | | | | | E-commerce fulfillment platforms • Amazon Fulfillment | |
| | | Booking platform • Intra | | | | | | | Tracking platforms • ATTI • Detrack • Fleetmatics • HLocate • KeepTruckin • Traxens | |
| Enabler | Digital back-end/IT solutions | Exchange platforms • Cargofox • Load-Me • Cargomatic • Truckstop • China Speak | | | | | | | | |
| | | | Procurement platforms • MW4 | Supply-chain control • Berlinger | | | | | SaaS² or cloud-based optimization and information • CargoSmart • LeanLogistics • Routific • Transmetrics • Transporeon | |

¹Exchange to exchange.

²Software as a service.

A data-enabled shipping industry could also support its customers' supply chains in important ways—but that will require a truly new order of performance and efficiency. The real-time visibility of all container movements, reliable forecasts, and integrated flow management will pave the way for flexible, dynamic supply chains that all but eliminate waiting times and inefficiencies. This achievement will be especially beneficial for industries (such as automotive) that have increasingly complex supply chains or for those with special needs (such as cold chains). It will also allow smart logistics providers to differentiate themselves and earn premiums. But these opportunities won't appeal to all customers; other sectors will demand only basic logistics services at the lowest possible cost.

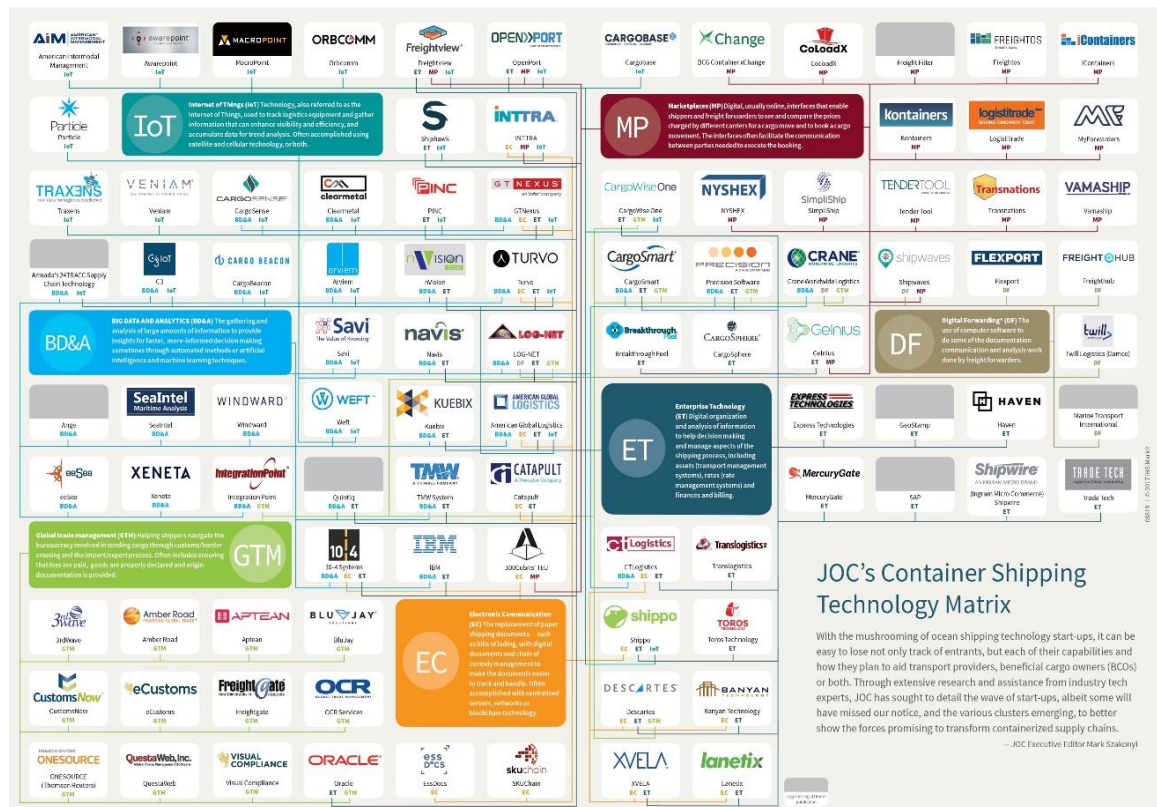
Emergence of new technology

“The emergence of new technology and ways to crunch numbers and analyse enormous amounts of data has changed many industries and is beginning to revolutionize the transport of containers across global supply chains.”..but its early days

“Internet of Things technology tracks logistics equipment and gathers information to enhance visibility and efficiency while accumulating data for trend analysis. It is often accompanied using satellite and cellular technology, or both. These include companies such as Traxens, MacroPoint, and Orbcomm.

Big Data and Analytics gathers and analyzes large amounts of information to provide insights for faster, more informed decision making, sometimes through automated methods or artificial intelligence or machine learning techniques. In this space are companies such as Savi, Arviem, Clearmetal, and CargoSense.

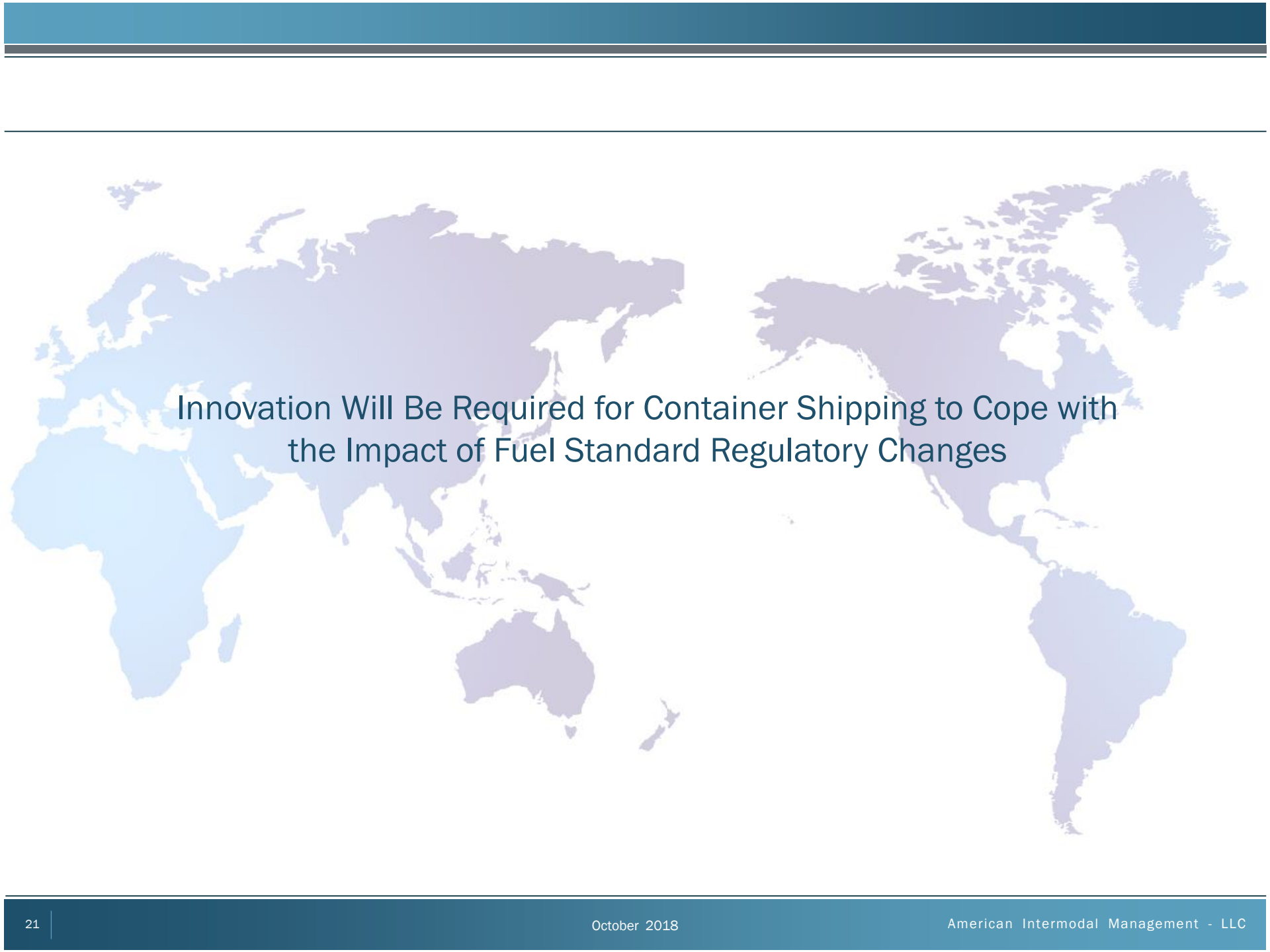
The last cluster, for now, is **Enterprise Technology**. This is the digital organization and analysis of information that helps decision making and managing aspects of the shipping process, including transport management systems and rate management systems, finances, and billing. Players in this space include Haven, Xvela, Translogistics, and MercuryGate.” Nov 15 JOC



What role will technology play in the continuing evolution of the container shipping sector?

Technology has the potential to enable a dramatic change in how carriers manage information and use data to execute in a more efficient manner. New technology will unlock abilities to:

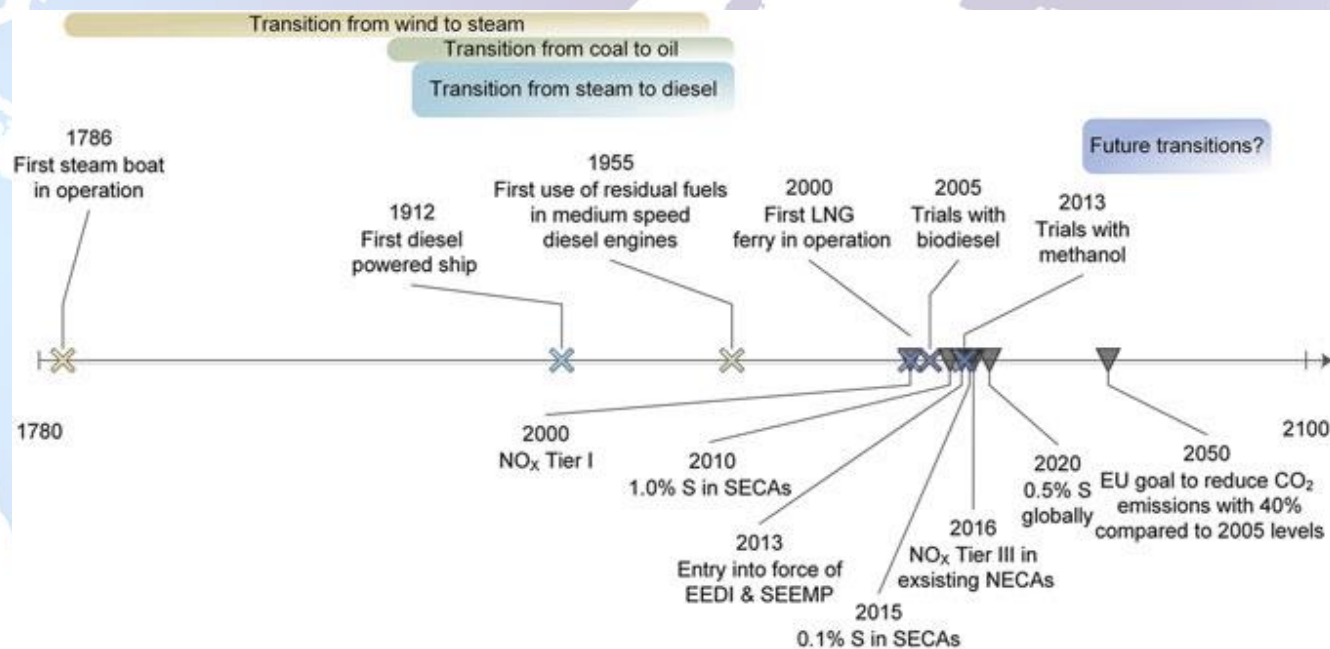
- **Enable greater use of data by the broad constituency of players** who rely on information to manage the “flow” of commerce
- Support the need for **sharing of data** between carriers, significantly between alliance partners, with port data platforms and others in ways that are either limited or don't yet exist
- Development of **new visibility tools that provide better upstream/downstream visibility** for;
 - **Improved asset management**
 - **Enabling better planning** of; stowage, terminal operations
 - Providing service partners **improved visibility** to better plan and execute connectivity and onward conveyance enhancing flow
 - Through improved visibility trigger the development of new tools for shippers to **more efficiently manage their supply chains and related financial transactions**
- Allow the more service oriented players to **create greater differentiation** in their product/service offering and much more



Innovation Will Be Required for Container Shipping to Cope with the Impact of Fuel Standard Regulatory Changes

Environmental regulatory changes will drive new innovations

The dramatic increases in cost that will be triggered by fuel standard changes in 2020 and the potential for carbon emissions regime developments in the future will drive innovation in propulsion, ship design and use of alternative fuels



Source: Shipping and the Environment; Karine Andersson, Francesco Baldi, Selma Brynolf, J. Fredrik Lindgren, Lena Granhag, and Erik Svensson 2016

Marine Fuel Sulphur Limits and CO₂ Regulationwill be a catalyst for innovation

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MARINE FUEL SULPHUR LIMITS and CO₂ REGULATION

Short and Long Term Cost and Innovation Drivers for
International Ocean Shipping



Ronald D. Widdows
Chairman, World Shipping Council
October 2016

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IMO Low Sulphur Fuel Rule

- Economic impact is large enough that non-compliance by some would disadvantage compliant companies.
- Liner shipping emphasis at IMO is on insuring that IMO Member States enforce the rules.
- Industry has backed “carriage bans” for non-compliant fuels.
- Enforcement is a shared responsibility of flag states and port states.
- Critical to have economic and enforcement *level playing field*.

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IMO* Air Emissions Regulations – Low Sulphur Marine Fuel

- Immediate Impact – Low Sulphur Fuel Requirements January 1, 2020
 - **Deadline Will Not Change**
- First ever global air emissions regulatory scheme
 - Covers high seas as well as coastal areas
- Cost estimates for compliant fuel vary but likely to be over \$10 billion annually just for containerized shipping.
- Carriers are seeking to provide transparency to customers on cost impacts.
- Costs will have to be shared through the supply chain.



*International Maritime Organization

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Global Shipping Fleet

- Over 50,000 ships globally
- About 5,100 containerships
- Some retrofitting for scrubbers will take place
 - About 2,500 on order and number is growing – but still less than 10% of ships
- LNG only an option for new builds


WORLD FLEET BY VESSEL TYPE




| Vessel Type | Share of value in dollars | Share of dead-weight tonnage |
|-----------------------------|---------------------------|------------------------------|
| Oil tankers | 14.6 | 29.2 |
| Dry bulk carriers | 22.2 | 40.5 |
| General cargo ships | 4.9 | 3.9 |
| Container ships | 11.2 | 13.1 |
| Gas carriers | 3.3 | 0.8 |
| Chemical tankers | 3.7 | 2.3 |
| Offshore | 4.1 | 18.6 |
| Ferries and passenger ships | 0.3 | 11.4 |
| Other / not available | 1.6 | 1.2 |

Source: UNCTAD secretariat calculations, based on data from Clarkson Research
Notes: Share of dead-weight tonnage is calculated for all ships of 100 gross tons and above. Share of value is estimated for all commercial ships of 1,000 gross tons and above.

Marine Fuel Sulphur Limits and CO₂ Regulationwill be a catalyst for innovation


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Low Sulphur Fuel Rule Compliance Strategies




- **Low Sulphur Bunker Fuel**
 - “Drop-in” compliance; likely to be the primary compliance method.
- **Exhaust gas scrubbers**
 - ROI may be attractive but retrofit issues and effluent discharge complicate the picture
- **LNG**
 - Some uptake for new-builds; unlikely retrofit for trans-oceanic vessels


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IMO Greenhouse Gas Strategy Reduction Objectives – How Do We Get There?

- Trans-oceanic vessels require energy-dense and portable power supply – no fueling stations mid-ocean.
- Compliant fuels and propulsion technologies do not exist today.
- No single company or country can finance necessary research and development activity to create compliant fuels and propulsion systems.
- Industry has proposed an international research and development effort through IMO to create compliance options.


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Benefits of Research and Development Based Approach

- Liner shipping has improved its fuel efficiency dramatically in recent years.
- But, the industry is fossil-fuel based and will remain so absent technological advancement.
- Vessels have 20-30 year lifespans.
- The sooner R&D starts and begins delivering results, the less investment is locked into fossil fuel powered ships.
- Energy requirements for large ships mirror those for small cities; innovations developed for sea can have land-based applications and synergies.


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The Long View

- Sulphur and greenhouse gas reduction requirements can spur innovation and make shipping more resilient.
- Air quality and greenhouse gas challenges for shipping are driven by reliance on fossil fuels.
- Fossil fuel pricing is unpredictable and subject to non-market geopolitical factors.
- The price signal from sulphur regulation reinforces the drive to efficiency inherent in greenhouse gas regulation.
- Long-term solutions to these two regulatory challenges are symbiotic – the same solutions serve both objectives.
- A formal support structure for R&D on new fuels and propulsion systems is critical to effective solutions that do not strand capital investment.

Update – IMO MEPC 73 action

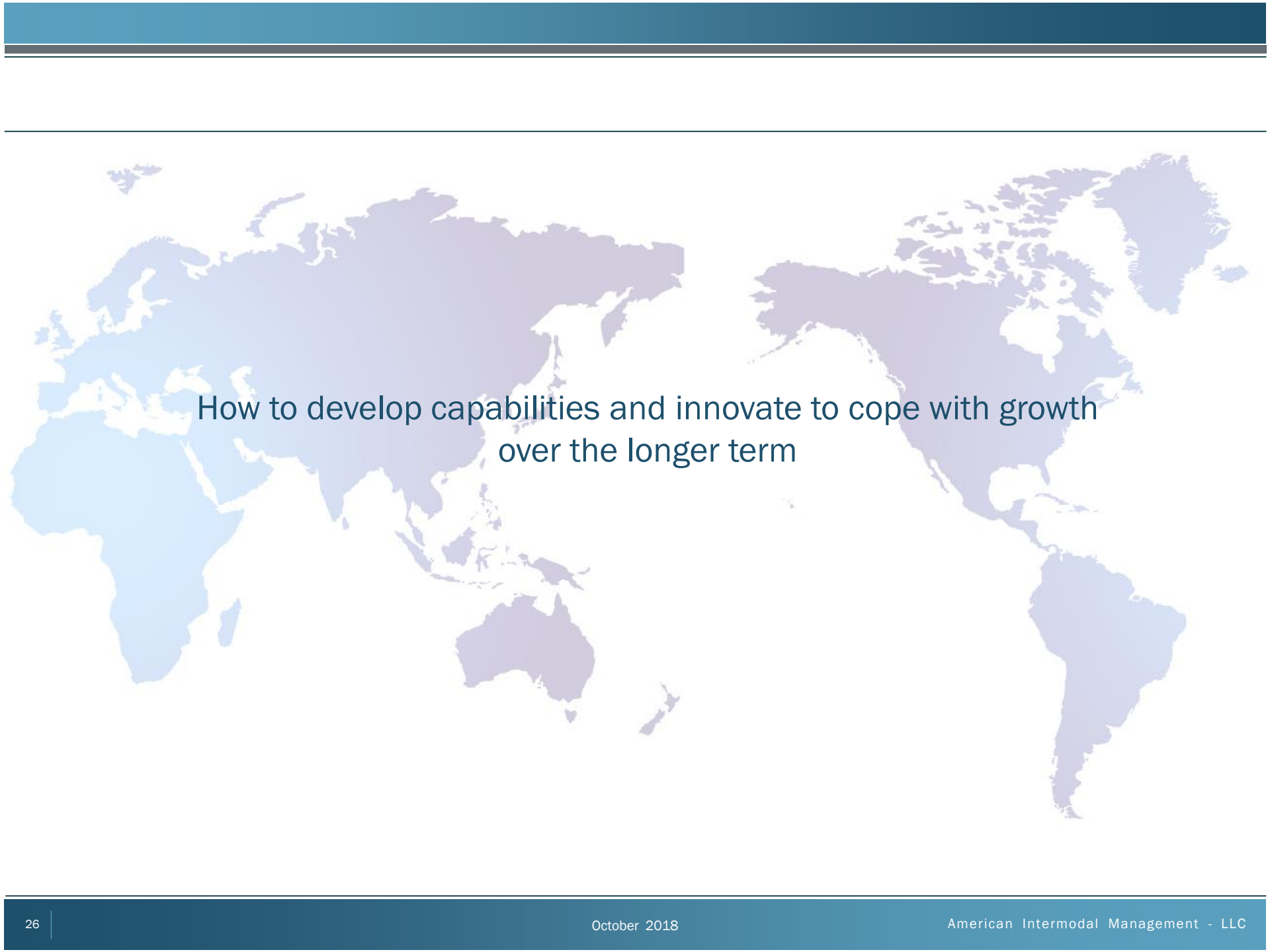
On October 24th, the IMO MEPC took the following actions:

IMO GHG Strategy –

- IMO's Marine Environment Protection Committee (MEPC) has decided to extend discussions on the Energy Efficiency Design Index (EEDI) Phase 3 standards applicable to container ships to MEPC 74.
- The World Shipping Council has been invited to make a formal submittal to MEPC 74 proposing specific Phase 3 EEDI reduction rates applicable to the container fleet.

2020 Sulphur Limits –

- The Committee formally adopted the restriction on the carriage of fuel carried as bunkers exceeding 0.50% sulphur content (excepting ships using scrubbers, LNG, or carrying HFO as cargo).
 - The carriage amendments will become effective on 1 March 2020.
 - Calls for delaying the carriage restriction were not approved.
 - The committee also agreed to request data on issues encountered in the initial period following 1 January 2020, but there will be no "experience building phase" with any connection to relaxed enforcement.



How to develop capabilities and innovate to cope with growth
over the longer term

McKinsey: Six Sources of Value Creation....looking decades into the future

1 GREATER ECONOMIES OF SCALE



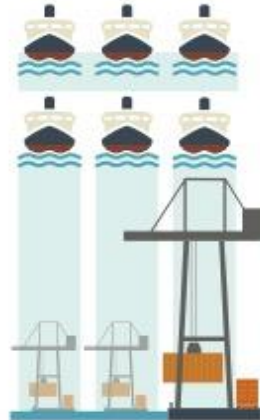
2 FLEXIBILITY



3 SUPPLY CHAIN RELIABILITY AND PREDICTABILITY



4 CONSOLIDATION AND INTEGRATION



5 AUTOMATION AND PRODUCTIVITY



6 ENVIRONMENTAL PERFORMANCE



The container transport industry is characterised by short-term commercial competition on the back of investments in long-life assets. A ship launched today can expect to be on the water for the next 20 to 25 years. A container terminal will typically operate even longer, though individual pieces of equipment like cranes may be replaced or upgraded. In contrast, the fast-paced real-time competition for a customer's cargo shipment will feel entirely divorced from any long-term macro trends.

Therefore, looking 25 years out – to 2043 – is both essential and foolish. Indications of what the future holds can help companies position themselves for success. At the same time, industry players' long-term investments and the accumulated impact of many short-term decisions will come to define the future state.

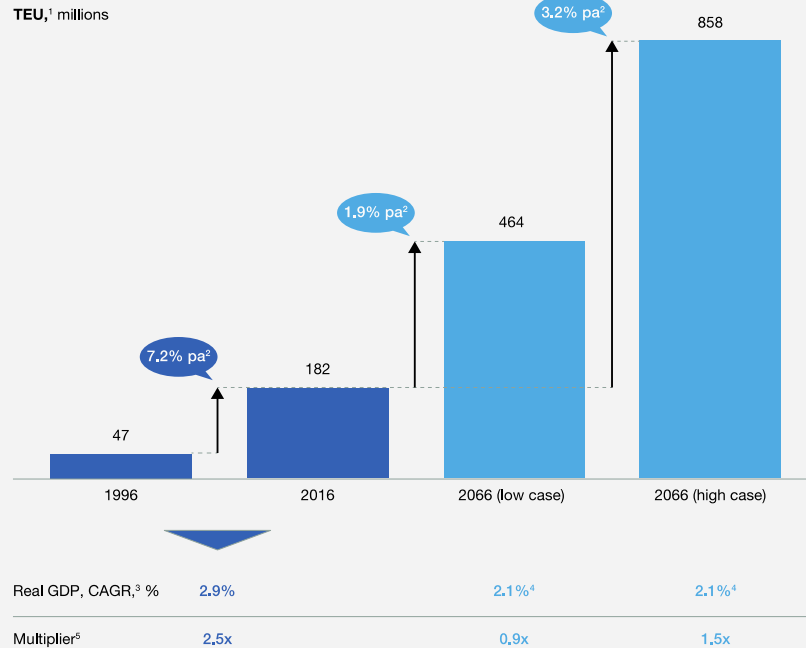
Looking into the future; scale, greater levels of consolidation and integration are seen as trends that will continue to drive the sector

Achieving improved supply chain reliability and predictability will require both mindset and structural changes

Future growth....how to cope....how will innovation enable efficient growth...

Given the constraints that exist in many regions; inadequate infrastructure, restrictive regulations that inhibit or protract new development, stressed landside resources and more....new methodologies, leveraging technology and new and innovative approaches will have to be employed to cope with future growth in trade

Exhibit 5 'Peak container' is not on the horizon.



¹Twenty-foot equivalent unit.

²Per annum.

³Compound annual growth rate.

⁴Based on same growth in output per worker as 1966–2016 (1.8% a year) and slowing employment growth (0.3% a year).

⁵Forecast multipliers are assumptions and not the result of modelling.

Source: Alphaliner; McKinsey Global Institute

McKinsey&Company

Container shipping: The next 50 years

Travel, Transport & Logistics October 2017



The Next Phase of Development.....Imagine....

- A **dramatic shift in how data/information is managed**; away from proprietary systems to more open architecture
- **Greater collaboration** to enable better upstream visibility; better operational planning and execution
- **New operating methodologies** with a greater degree of collaboration and cooperation between service providers and those they serve to combat complexity, that target both reducing cost and improving service/impact on shippers supply chains
- **Deployment of new technologies**; like AI, Cloud, Blockchain and other advances to bring network optimization and asset utilization to new levels of efficiency....predictive versus reactionary
- The **ability for shippers to have much greater visibility** of the flow of their cargo (warts and all) and interact with carriers in ways not normal in this sector
- **A sector that will cope with the evolution of disruptive events** and technologies that will impact future supply chain strategies of their customers
- Innovations that enable a significant improvement in the sectors contributions toward **reducing the environmental impact of container shipping**
- Development of **transparent and sustainable pricing** that will support continued investment in the sector

An industry that understands the **critical need for a different approach to engaging with those they serve** and a **shipping community that values consistently delivered service**

